

OBSERVATIONS ON THE RELATIONS OF THE ORGAN
OF JACOBSON IN THE HORSE.

BY R. BROOM, M.D., B.Sc.

(PLATE I.)

In Herzfeld's recent paper "Ueber das Jacobson'sche Organ des Menschen und der Säugethiere"* he calls attention to the peculiarity in the Horse in that in it there is no naso-palatine canal opening into the mouth, and that the duct of Jacobson, instead of opening into the naso-palatine canal as in most higher mammals, opens into a deep depression in the nasal floor. This condition he found to exist in both the Horse and the Ass, and he states that according to Gratiolet† a similar condition is found in the Camel and Giraffe.

As I had from my studies on the organ of Jacobson in different Orders come to the conclusion that though the degree of development of the organ may vary greatly in different genera the type on which it is formed is remarkably uniform in each Order, I naturally became anxious to find the explanation of how it was that the organ in the Horse differed apparently so remarkably from the normal Ungulate type as found in the Sheep.

Being fortunate in having in my possession the head of a foetal Horse I have made a study of the relations of the organ by means of a series of vertical sections. Though the examination of a younger specimen would doubtless have been even more

* Zoolog. Jahrbuch, Abtheil. für Anatomie und Ontogenie. Bd. iii. 1881.

† Recherches sur l'organe de Jacobson. aris, 1845.

satisfactory, as the present series sufficiently elucidates the nature of the peculiarity, I think it well to publish the present results.

The Horse differs from most mammals in having the premaxillaries developed in such a way as to carry the palate forward in advance of the nares and forming a sort of rostrum—a condition seen in a much greater degree in the Tapir. As a result of this development a large portion of the anterior part of the nasal septum is clasped between the premaxillaries, and the lateral cartilages; which in most mammals become the “cartilages of the nasal floor,” are here confined by the premaxillaries and prevented from developing laterally to any great degree, and seem to compensate for the want of lateral expansion by developing downwards.

Figure 1, Plate 1., represents a section immediately behind the point where the premaxillary gives off its palatine process. A portion of the lateral cartilage (*l.c.*) is seen passing downwards from the nasal septum (*n.s.*) between the premaxillary and the palatine process. A little below it may be observed an oval cartilage cut across—this is an anterior process from the lateral cartilage. It passes well forward, approaching nearer to the palate, and ending a little behind the rudimentary papilla. The most noteworthy peculiarity of this section is that there is no trace of the naso-palatine canal to be seen, nor is there in any anterior section. Even by the sides of the papilla, where the anterior opening of the canal would be expected, I have failed to find even a rudiment.

A little distance behind the plane of figure 1 the anterior process of the lateral cartilage is seen united with the main part, which though still attached to the nasal septum is becoming constricted off. In a slight concavity on the inferior end of the cartilage is found on this plane the anterior closed end of the imperfect naso-palatine canal (*n.p.c.*).

In figure 3 the naso-palatine canal is found to have a distinct lumen, and on its inner side it is supported by a small downward cartilaginous process.

In the next succeeding planes the relation of the duct to the cartilages is very similar, but the lateral cartilage is found becoming shorter and broader and detaching itself from the nasal septum (fig. 4).

On reaching the plane shown in fig. 5 the nasal cavity is found to be approaching the lateral cartilage, which here becomes for the first time a "nasal-floor cartilage" proper. At its outer angle it is seen sending up a process which further back is found to represent the rudimentary cartilage of the nasal wall. Here the naso-palatine canal is seen flattened out and about to give off Jacobson's duct. The inner part or Jacobson's duct is almost surrounded by cartilage.

In figure 6 the ducts are seen separated, and a cartilaginous partition passes between them.

In the following figure the outer part of the cartilage is seen detached, while the inner forms a complete investment for Jacobson's duct. Between the two portions of the divided lateral cartilage is found the naso-palatine canal about to open into the nasal cavity.

Behind this region the organ and its cartilages are found quite to follow the ordinary mammalian form.

It will be observed that the points in which the Horse differs from the normal type are these:—(1) occlusion or absence of the anterior part of the naso-palatine canal, leading to the secretion from Jacobson's organ passing backwards into the nasal cavity by the upper part of the naso-palatine canal; and (2) the anterior processes of cartilage usually given off from the nasal-floor or lateral cartilage and passing forward supporting Jacobson's duct and the naso-palatine canal, here for the greater part remain united with the lateral cartilage. In the absence of even a trace of the canal in its anterior part, it is doubtful whether the anterior cartilaginous process represents Jacobson's or Stenson's cartilages or a fusion of both—probably the latter.

In almost all other respects there is a close agreement between the condition of parts in the Horse and those in most other Ungulates.

Fig. 10 shows a section of part of the nose of a very small foetal Calf. Here both Jacobson's and Stenson's cartilages are well developed and seem distinct from the broad nasal-floor cartilage. If this be compared with figures 4 or 5 the close resemblance will be seen; in fact the only marked difference is that in the Horse the cartilages of Jacobson and Stenson are united with the nasal-floor cartilage, in the Calf distinct. But all the corresponding parts can easily be observed.

Figure 11 represents a section of the foetal Calf corresponding to figure 6 in the Horse. Here the duct cartilages are united with the nasal-floor cartilage as in the Horse. The resemblance is, however, somewhat marred by the enormous development of the cartilage of the nasal wall in the Calf. Such variations in cartilaginous development, however, occur in very nearly allied forms as the Cat and Dog.

The agreement of figure 12 with figure 8 is most striking.

The peculiarities in the Horse are probably due to the strong development of the premaxillary bones leading to the occlusion of the anterior part of the naso-palatine canal and to the vertical direction assumed by the lateral cartilage permitting the duct cartilages to remain united with the main body.

The similar condition in the Camel is probably accounted for by the fact that its very recent ancestors had remarkably well developed incisors, *e.g.*, *Protolabes* from the Upper Miocene of Oregon.

In the Giraffe the explanation is not very manifest.

I have to acknowledge my indebtedness to Dr. John Mackie and Mr. A. Robb, F.R.C.V.S., of Glasgow, for the foetal horse examined, and to Mr. Alf. Swan, of Taralga, for the foetal calf.

REFERENCES TO PLATE I.

a.l.c., anterior process of lateral cartilage; *J.c.*, Jacobson's cartilage; *J.d.*, Jacobson's duct; *J.o.*, Jacobson's organ; *l.c.*, lateral cartilage; *Mx.*, maxillary; *n.f.c.*, nasal-floor cartilage; *n.p.c.*, naso-palatine canal; *n.w.c.*, nasal-wall cartilage; *n.s.*, nasal septum; *p.Pmx.*, palatine process of premaxillary; *Pmx.*, premaxillary.

Figs. 1-9.—Transverse vertical sections through snout of foetal Horse (head length about 7.5 c.m.) \times 7.

Figs. 10-12.—Transverse vertical sections through snout of foetal Calf (head length about 2 c.m.) \times 30.

Dotted portion represents cartilage; parts shaded by lines represent the regions of ossification.